

## **REMARKS**

This Preliminary Amendment cancels, without prejudice, originally-filed claims 1-10 in underlying PCT Application No. PCT/DE00/00836. New claims 11-23 have been added merely to conform the claims to U.S. Patent and Trademark Office practice and standards, and do not add new matter to the application. Furthermore, the addition of these new claims in no way addresses any issues of patentability, and the new claims are provided to place the application in condition for allowance.

The amendment to the abstract and the substitute specification are provided to conform the specification and abstract of the above-identified application to the U.S. Patent and Trademark Office practice, and do not introduce new matter into the application.

The amendments to the "Abstract" and "Claims" are reflected in the attached "Version With Marked Changes Made."

Enclosed is International Search Report, dated September 4, 2000, issued in the underlying PCT Application No. PCT/DE00/00837. The Search Report includes a list of documents that were considered by the Examiner in the underlying PCT application.

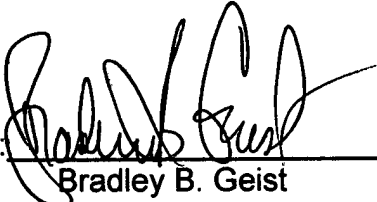
Also enclosed is the International Preliminary Examination Report, dated July 3, 2000, issued in the underlying PCT Application No. PCT/DE00/00837.

Applicants also enclose an Information Disclosure Statement and accompanying Form 1449. With the exception of the references listed in the Search Report, the references identified on Form 1449 are provided herewith.

Applicants assert that the present invention is new, non-obvious, and useful. Favorable consideration and allowance of the claims are respectfully requested.

Respectfully submitted,

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By:   
Bradley B. Geist  
Reg. No. 27,551

BAKER BOTTS L.L.P.  
30 Rockefeller Plaza, 44th floor  
New York, New York 10112-0228  
(212) 408-2562

### Version With Marked Changes Made

We claim:

1. ~~A master control system for a rolling mill, especially a mill train, the rolling mill, especially the mill train, having at least one rolling stand driven by means of a drive system, and the master control system having an automation device for the open-loop and/or closed-loop control of the rolling stand and a commissioning computer, characterized in that~~
  - (i) ~~the commissioning computer is designed for the commissioning of the drive system and of the automation device,~~
  - (ii) ~~has at least one bus system for the transmission of operating parameters and/or program code from the commissioning computer to at least one of the components comprising the drive system and the automation device,~~  
~~and~~
  - (iii) ~~in that the bus system is designed for the transmission of information necessary for the operation of the rolling mill, especially the mill train, between the drive system and the automation device.~~
2. ~~The master control system as claimed in claim 1, it having an operator control computer for monitoring and/or influencing the rolling mill, especially the mill train, characterized in that the commissioning computer is designed for the commissioning of the operator control computer.~~

- ~~3. The master control system as claimed in claim 2, characterized in that the bus system is designed for the transmission of operating parameters and/or program code from the commissioning computer to the operator control computer.~~
- ~~4. The master control system as claimed in claim 3, characterized in that the bus system is designed for the transmission of information necessary for the operation of the rolling mill, especially the mill train, between the operator control computer and at least one of the components comprising the drive system and the automation device.~~
- ~~5. The master control system as claimed in claim 3 or 4, characterized in that it has at least one first bus system for the transmission of operating parameters and/or program code from the commissioning computer to the automation device, connecting the commissioning computer and the automation device by a data link, and has at least one second bus system for the transmission of operating parameters and/or program code to the drive system, connecting the automation device and the drive system by a data link.~~
- ~~6. The master control system as claimed in claim 5, characterized in that the second bus system is designed for the transmission of information necessary for the operation of the rolling mill, especially the mill train, between the automation device and the drive system.~~

~~7. The master control system as claimed in claim 5 or 6, it having an operator control computer for monitoring and/or influencing the rolling mill, especially the mill train, characterized in that the operator control computer is connected to the first bus system by a data link, and in that the first bus system is designed for the transmission of information necessary for the operation of the rolling mill, especially the mill train, between the operator control computer and the automation device.~~

~~8. The master control system as claimed in one of the preceding claims, characterized in that it has at least two automation devices of different types and in that the commissioning computer is designed for the commissioning of both automation devices.~~

~~9. A rolling mill, especially a mill train, the rolling mill, especially the mill train, having at least one rolling stand driven by means of a drive system and a master control system with an automation device for the open-loop and/or closed-loop control of the rolling stand and a commissioning computer, characterized in that~~

~~(i) the commissioning computer is designed for the commissioning of the drive system and of the automation device,~~

~~(ii) has at least one bus system for the transmission of operating parameters and/or program code from the commissioning computer to at least one of the components comprising the drive system and the automation device,~~

~~and~~

~~(iii) — in that the bus system is designed for the transmission of information necessary for the operation of the rolling mill, especially the mill train, between the drive system and the automation device.~~

~~10. — A method of operating a rolling mill, especially a mill train, by means of a master control system as claimed in one of the preceding claims, the rolling mill, especially the mill train, having at least one rolling stand driven by means of a drive system, and the master control system having an automation device for the open-loop and/or closed-loop control of the rolling stand and a commissioning computer, characterized in that the commissioning of the drive system and of the automation device takes place by means of one and the same commissioning computer and a bus system for the transmission (i) — of operating parameters and/or program code from the commissioning computer to at least one of the components comprising the drive system and the automation device and of information necessary for the operation of the rolling mill, especially the mill train, between the drive system and the automation device.~~

--11. — A master control system for a rolling mill, comprising at least one rolling stand, driven by a drive system, an automation device for the open-loop and/or closed-loop control of the rolling stand, and a commissioning computer, wherein the commissioning computer is designed for the commissioning of the drive system and of the automation device, and has at least one bus system for the transmission of operating parameters and/or program code from the commissioning computer to at least one component comprising the drive system and the automation device, and further wherein the bus system is designed for the transmission of information necessary for the operation of the rolling mill between the drive system and the automation device.--

--12. — The master control system according to claim 1, further comprising an operator-control computer for monitoring and/or influencing the rolling mill and wherein

the commissioning computer is designed for the commissioning of the operator-control computer.--

--13. The master control system according to claim 2, wherein the bus system is designed for the transmission of operating parameters and/or program code from the commissioning computer to the operator-control computer.--

--14. The master control system according to claim 3, wherein the bus system is designed for the transmission of information necessary for the operation of the rolling mill between the operator-control computer and at least one of the components comprising the drive system and the automation device.--

--15. The master control system according to claim 1, further comprising at least one first bus system for the transmission of operating parameters and/or program code from the commissioning computer to the automation device, wherein the commissioning computer and the automation device are connected by a data link, and at least one second bus system for the transmission of operating parameters and/or program code to the drive system, wherein the automation device and the drive system are connected by a data link.--

--16. The master control system according to claim 5, wherein the second bus system is designed for the transmission of information necessary for the operation of the rolling mill, between the automation device and the drive system.--

--17. The master control system according to claim 5 further comprising an operator-control computer for monitoring and/or influencing the rolling mill, wherein the operator-control computer is connected to the first bus system by a data link, and the first bus system is designed for the transmission of information necessary for the operation of the rolling mill between the operator-control computer and the automation device.--

--18. The master control system according to claim 1, further comprising at least two automation devices of different types and wherein the commissioning computer is designed for the commissioning of both automation devices.--

--19. The master control system according to claim 1, wherein the rolling mill is a mill train.--

--20. A rolling mill comprising at least one rolling stand driven by a drive system, and a master control system with an automation device for the open-loop and/or closed-loop control of the rolling stand, and a commissioning computer, wherein the commissioning computer is designed for the commissioning of the drive system and of the automation device, further comprising at least one bus system for the transmission of operating parameters and/or program code from the commissioning computer to at least one component comprising the drive system and the automation device, and



wherein the bus system is designed for the transmission of information necessary for the operation of the rolling mill, between the drive system and the automation device.

--21. A rolling mill according to claim 10, wherein said mill is a mill train.--

--22. A method of operating a rolling mill, comprising utilizing a master control system comprising a rolling mill, having at least one rolling stand driven by a drive system, an automation device for the open-loop and/or closed-loop control of the rolling stand, and a commissioning computer, wherein the commissioning of the drive system and of the automation device takes place by means of the same commissioning computer, and further comprising a bus system for the transmission (i) of operating parameters and/or program code from the commissioning computer to at least one of the components comprising the drive system and the automation device, and (ii) of information necessary for the operation of the rolling mill, between the drive system and the automation device.--

--23. A method according to claim 12, wherein the rolling mill is a mill train.--

## Abstract

### ~~Master control system for a rolling mill, especially for a mill train~~

Master control system for a rolling mill, especially a mill train, the rolling mill, especially the mill train, having at least one rolling stand driven by means of a drive system, and the master control system having an automation device for the open-loop and/or closed-loop control of the rolling stand. The master control system also has a commissioning computer for the commissioning of the drive system and of the automation device.

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PATENT

BAKER BOTTS L.L.P. JC09 Rec'd PCT/PTO 01 OCT 2001

30 ROCKEFELLER PLAZA

NEW YORK, NEW YORK 10112

TO ALL WHOM IT MAY CONCERN:

Be it known that WE, PETER SOPP and SIEGBERT STEIDL, citizens of Germany, whose post office addresses are Ottensooser Str. 53, 90482 Nuernberg, Germany; and Schuetzengraben 16D, 91074 Herzogenaurach, Germany; respectively, have made an invention in:

MASTER CONTROL SYSTEM FOR A ROLLING MILL, ~~ESPECIALLY FOR A~~  
~~MILL TRAIN~~

of which the following is a

## SPECIFICATION

### FIELD OF THE INVENTION

[0001] The invention relates to a master control system for a rolling mill, ~~especially~~ and particularly a mill train, ~~the rolling mill, especially the mill train,~~ having both of which have at least one rolling stand driven by means of a drive system, and the master control system having an automation device for the open-loop and/or closed-loop control of the rolling stand; ~~The and invention~~ The and invention also relates to a method of operating a rolling mill, ~~especially on~~ a mill train, having at the aforesaid master control system ~~of this type.~~

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### COMPARISON

### **BACKGROUND OF THE INVENTION**

[0002] It is customary ~~for~~in the commissioning of individual components of a rolling mill or a mill train to connect said components by a data link to a commissioning computer and to commission them by transferring a program code or operating parameters. After completion of this process, this operation is repeated with the next system component. System components in this sense may be, for example, drive systems or automation devices. When individual components, for example defective components, are exchanged, the new component, for example a new automation device or a new drive system, is also correspondingly commissioned.

~~[0003] The object is to improve the commissioning.~~

### **SUMMARY OF THE INVENTION**

~~[0003] [0004] The~~The object of the present invention is to improve the commissioning process. This object is achieved according to the present invention by a ~~master control system as claimed in claim 1, a rolling mill, especially a mill train, as claimed in claim 9 and a method as claimed in claim 10. For a rolling mill, especially a mill train,~~rolling mill which has at least one rolling stand driven by means of a drive system and a master control system with at least one automation device for the open-loop and/or closed-loop control of the rolling stand, ~~it is provided here that the.~~ The master control system has a commissioning computer for the commissioning of the drive system and of the automation device. According to ~~the method as claimed~~  
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by the method of the present invention, the commissioning of the drive system and of the automation device takes place by means of the commissioning computer. The master control system has at least one bus system for the transmission of operating parameters and/or program code from the commissioning computer to at least one of the components comprising the drive system and automation device. Furthermore, the bus system is designed for the transmission of information necessary for the operation of the rolling mill, and especially the mill train, between the drive system and the automation device.

~~[0004]~~ ~~[0005]~~ In an advantageous refinement a preferred embodiment of the present invention, the master control system has an operator-control computer for monitoring and/or influencing the rolling mill, ~~especially~~ or the mill train, and the commissioning computer ~~being~~ is designed for the commissioning of the operator-control computer.

~~[0005]~~ ~~[0006]~~ In an especially advantageous refinement a further preferred embodiment of the present invention, the bus system is designed for the transmission of operating parameters and/or program code from the commissioning computer to the operator-control computer.

~~[0006]~~ ~~[0007]~~ In an especially advantageous refinement yet another preferred embodiment of the present invention, the bus system is designed for the transmission of information necessary for the operation of the rolling mill, ~~especially~~ or the mill train, between the operator-control computer and at least one of the components

comprising the drive system and the automation device.

~~[0007] [0008] In a further advantageous refinement~~Other preferred embodiments of the present invention, ~~the~~include a master control system has at least one first bus system for the transmission of operating parameters and/or program code from the commissioning computer to the automation device; ~~connecting with~~ the commissioning computer and the automation device being connected by a data link; and ~~has~~ at least one second bus system for the transmission of operating parameters and/or program code to the drive system, ~~connecting with~~ the automation device and the drive system being connected by a data link. The second bus system may also be designed for the transmission of information necessary for the operation of the rolling mill, or mill train, between the automation device and the drive system.

~~[0009] In a further advantageous refinement of the invention, the second bus system is designed for the transmission of information necessary for the operation of the rolling mill, especially the mill train, between the automation device and the drive system.~~

~~[0008] [0010] In a further advantageous refinement of the invention,~~It is also preferred if the master control system has an operator-control computer for monitoring and/or influencing the rolling mill, ~~especially the~~or mill train, with the operator-control computer being connected to the first bus system by a data link, and the first bus system being designed for the transmission of information necessary for

the operation of the rolling mill, ~~especially the~~or mill train, between the operator-control computer and the automation device.

~~[0009] [0011]~~—In a further advantageous refinement~~yet~~ another preferred embodiment of the invention, the master control system has at least two different types of automation devices ~~of different types~~and the commissioning computer ~~being~~is designed for the commissioning of both automation devices.

### BRIEF DESCRIPTION OF THE INVENTION

~~[0010] [0012]~~—Further advantages and details ~~emerge~~of the present invention will be apparent from the following description of an exemplary embodiment: as shown in Figure 1 which shows a master control system.

## DETAILED DESCRIPTION OF THE INVENTION

~~[0011] [0013]~~ The figure shows a master control system in an exemplary configuration. ~~Provided here is~~In Figure 1, an industrial Ethernet bus 9, 9 is shown, which connects two identically or differently designed automation devices 5 and 6, an operator-control computer 4 and a commissioning computer 1 to one another by a data link. The industrial Ethernet bus 9 is connected to a standard Ethernet bus 8 via a computer 7. Connected to the standard Ethernet bus 8 are an operator-control computer 2 and a central operator-control computer 3. Parts of the rolling mill (or parts of the mill train) can be operated via the operator-control computers 2 and 4. The interaction of individual system parts of the rolling mill (or the mill train) can be operated by means of the central operator-control computer 3. Various actuators or sensors 12, 13, 14, 15 are connected by a data link to the automation device 5 via a bus system 23, which is designed as a Profibus. Furthermore, decentralized peripherals 10 are connected to the automation device 5 via the bus system 23. Various actuators or sensors 16, 17, 18, 19 are connected by a data link to the automation device 6 via a bus system 24, which is designed as a Profibus. Furthermore, decentralized peripherals 11 are connected to the automation device 6 via the bus system 24. Moreover, various actuators and sensors 20, 21, 22 can be activated and evaluated via the decentralized peripherals 11 and the automation device 6.

~~[0014]~~ Various actuators and sensors 20, 21, 22 can be activated and evaluated via the decentralized peripherals 11 and the automation device 6.

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~~[0012] [0015]~~ The operator-control computers 2, 3, 4, the automation devices 5, 6, the decentralized peripherals 10, 11, the actuators and sensors 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and the bus systems 8, 9, 23, 24 serve for the operation of the rolling mill ~~(or the mill train)~~. Furthermore, information necessary for the commissioning, such as operating parameters or program codes, ~~that is i.e.,~~ software, are transmitted from the commissioning computer 1 to the automation devices 5, 6, the decentralized peripherals 10 and 11 and to the actuators and sensors 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, ~~2222~~, and, if appropriate, to the operator-control computers 2, 3, 4. The transmission of the commissioning information takes place via the corresponding bus systems 8, 9, 23 and 24. Furthermore, the commissioning computer 1 may also be used for the development of the master control system.

~~[0016]~~ Furthermore, it may also be provided that the commissioning computer 1 is used for the development of the master control system.

~~[0013] [0017]~~ It is advantageous to provide ~~that~~ diagnostic information on the operating capability of the automation devices 5, 6 of the decentralized peripherals 10, ~~11~~, of the actuators and sensors 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, ~~2222~~, and, if appropriate, of the operator-control computers 2 and 4 some or all of which are transmitted to the operator-control computers 2, 3 and 4. The sensors and actuators 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 serve, by way of example, the open-loop and closed-loop control of one or more of the following: drive systems for rolling stands, cooling sections, coilers or loop lifters.

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~~{0018} The sensors and actuators 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 serve by way of example for the open loop and closed loop control of drive systems for rolling stands, of cooling sections, of coilers or loop lifters.~~